

A number of single-theodolite pilot-balloon observations exceeding 15,000 meters in altitude were made during the month but, since double-theodolite observations above this altitude are as yet unavailable, the reliability of these results must remain, to a large extent, uncertain.

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during September, 1922.

TEMPERATURE (°C.).												
Altitude, M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	De- parture from aver- age.	Mean.	De- parture from aver- age.	Mean.	De- parture from aver- age.	Mean.	De- parture from aver- age.	Mean.	De- parture from aver- age.	Mean.	De- parture from aver- age.
Surface..	22.9	-1.0	20.3	+1.5	24.3	-0.4	15.2	+0.4	25.1	+0.3	24.2	+1.9
250.....	22.8	-0.9	20.3	+1.5	23.9	-0.4	15.2	.....	24.8	+0.7	24.0	+1.9
500.....	22.3	+0.3	19.6	+1.2	21.1	-0.7	15.7	+0.9	23.9	+1.4	21.7	+1.0
750.....	21.2	+0.6	18.9	+1.6	19.3	-0.8	16.7	+2.4	22.5	+1.5	19.8	+1.7
1,000.....	19.7	+0.5	18.4	+2.1	18.1	-0.7	16.3	+3.0	21.1	+1.3	18.2	+1.6
1,250.....	18.3	+0.5	17.4	+2.2	17.0	-0.5	15.4	+3.1	19.5	+1.0	16.6	+1.5
1,500.....	17.0	+0.6	16.1	+2.1	15.7	-0.4	14.4	+3.2	17.9	+0.6	14.7	+1.2
2,000.....	14.4	+0.6	13.3	+2.0	13.0	-0.3	11.9	+3.2	14.9	0.0	12.3	+1.5
2,500.....	11.2	+0.4	9.9	+1.8	9.9	-0.3	8.8	+3.1	12.2	-0.1	9.5	+1.3
3,000.....	8.0	+0.2	6.4	+1.5	6.6	-0.3	6.1	+3.4	9.7	0.0	6.6	+0.9
3,500.....	4.6	+0.1	2.9	+1.0	3.3	-0.3	3.5	+3.5	6.5	-0.6	3.8	+0.8
4,000.....	1.6	+0.2	-0.2	+0.8	-0.1	-0.3	1.8	+4.3	3.1	-1.2	0.8	+0.5
4,500.....	-1.9	+0.1	-3.6	+0.5	-4.6	-0.3	0.2	+5.1	.....	.....	.....	.....
5,000.....	.....	.....	-5.4	+1.3	.....	.....	-1.9	+5.6	.....	.....	.....	.....

TABLE 1.—Free-air temperatures, relative humidities, and vapor pressures during September, 1922—Continued.

RELATIVE HUMIDITY (%).												
Altitude. M. S. L. (m.)	Broken Arrow, Okla. (233m.)		Drexel, Nebr. (396m.)		Due West, S. C. (217m.)		Ellendale, N. Dak. (444m.)		Groesbeck, Tex. (141m.)		Royal Center, Ind. (225m.)	
	Mean.	De- parture from average.	Mean.	De- parture from average.	Mean.	De- parture from average.	Mean.	De- parture from average.	Mean.	De- parture from average.	Mean.	De- parture from average.
Surface...	62	-4	60	-4	59	-3	69	+4	69	-8	56	-7
250.....	62	-4	60	-2	60	-2	69	+4	69	-8	56	-7
500.....	58	-7	60	-2	67	+1	66	+2	68	-9	57	-7
750.....	57	-7	54	-5	69	+2	58	-3	68	-7	59	-5
1,000.....	57	-6	51	-6	67	+1	54	-5	69	-4	60	-3
1,250.....	56	-7	51	-4	65	+1	51	-5	71	0	62	0
1,500.....	54	-7	52	-1	62	0	49	-5	72	+4	62	+1
2,000.....	53	-4	51	0	57	-1	44	-6	70	+9	59	+1
2,500.....	51	+2	55	+3	56	-1	43	-6	61	+5	56	+1
3,000.....	53	+4	59	+6	51	-1	44	-5	51	-3	56	+4
3,500.....	55	+3	59	+8	47	-1	46	-1	42	-9	59	+8
4,000.....	52	0	56	+6	47	-1	43	-2	50	+3	66	+1.5
4,500.....	67	+7	58	+5	49	-1	41	-2	.....	.....	.....	.....
4,000.....	.....	.....	52	+1	.....	.....	40	-1	.....	.....	.....	.....

VAPOR PRESSURE (mb.).												
Surface...	17.16	-2.69	14.09	-0.02	17.75	-1.43	11.84	+0.00	21.84	-2.05	17.02	+0.27
250.....	17.09	-2.64	14.09	-0.02	17.59	-1.36	11.84	+0.00	21.48	-1.61	16.84	+0.29
500.....	15.82	-1.87	13.37	-0.13	16.46	-1.00	10.66	+0.89	20.10	-0.91	15.14	+0.37
750.....	14.59	-1.38	11.89	-0.21	15.18	-0.94	10.68	+0.81	18.63	-0.35	14.06	+0.72
1,000.....	13.37	-1.06	10.95	-0.04	13.87	-0.74	9.57	+0.64	17.10	+0.24	13.14	+0.99
1,250.....	12.16	-0.86	10.25	+0.34	12.60	-0.52	8.61	+0.65	16.15	+0.97	12.24	+1.29
1,500.....	10.82	-0.68	9.51	+0.64	11.30	-0.48	7.68	+0.53	14.87	+1.38	11.07	+1.52
2,000.....	8.85	+0.93	7.96	+0.80	9.23	-0.41	6.15	+0.35	12.11	+1.71	9.22	+1.86
2,500.....	7.17	+0.87	6.50	+0.93	7.89	-0.29	4.89	-0.03	9.04	+0.95	7.19	+1.44
3,000.....	5.52	+1.07	5.74	+0.89	6.87	-0.29	4.31	+0.10	6.43	-0.15	5.93	+1.67
3,500.....	4.41	+0.83	4.64	+0.76	5.81	-0.29	3.88	+0.28	4.23	-0.99	5.52	+2.16
4,000.....	3.07	+0.47	3.31	+0.43	4.31	-0.29	3.35	+0.28	3.53	-0.53	5.21	+2.37
4,500.....	2.92	+0.79	3.31	+0.55	4.85	-0.29	3.03	+0.27	.....	.....	.....	.....
5,000.....	.....	.....	2.91	+0.61	.....	.....	2.63	+0.39	.....	.....	.....	.....

VAPOR PRESSURE (mb.).

Surface...	17.16	-2.69	14.09	-0.02	17.75	-1.43	11.84	+0.00	21.84	-2.05	17.02	+0.27
250.....	17.09	-2.64	.....	.....	17.59	-1.36	.....	.....	21.48	-1.61	16.84	+0.29
500.....	15.82	-1.87	13.37	-0.13	16.46	-1.00	11.66	+0.89	20.10	-0.91	15.14	+0.37
750.....	14.59	-1.38	11.89	-0.21	15.18	-0.94	10.68	+0.81	18.68	-0.35	14.06	+0.72
1,000.....	13.37	-1.06	10.95	-0.04	13.57	-0.74	9.57	+0.64	17.10	+0.24	13.14	+0.99
1,250.....	12.16	-0.86	10.25	+0.34	12.60	-0.52	8.61	+0.65	16.15	+0.97	12.24	+1.29
1,500.....	10.82	-0.68	9.51	+0.64	11.30	-0.48	7.68	+0.53	14.87	+1.38	11.07	+1.32
2,000.....	8.85	+0.03	7.96	+0.80	9.23	-0.41	6.15	+0.35	12.11	+1.71	9.22	+1.55
2,500.....	7.17	+0.87	6.80	+0.93	7.89	-0.29	4.89	-0.03	9.04	+0.95	7.19	+1.44
3,000.....	5.52	+1.07	5.74	+0.89	6.87	-0.29	4.31	+0.10	6.43	-0.15	5.93	+1.57
3,500.....	4.41	+0.83	4.64	+0.75	5.81	-0.29	3.88	-0.28	4.23	-0.99	5.52	+2.16
4,000.....	3.07	+0.47	3.67	+0.43	5.31	-0.29	3.35	-0.28	3.53	-0.53	5.21	+2.37
4,500.....	2.92	+0.79	3.31	+0.55	4.85	-0.29	3.03	+0.27	.....	.....	.....	.....
5,000.....	.....	.....	2.91	+0.61	.....	.....	2.65	+0.39	.....	.....	.....	.....

TABLE 2.—Free-air resultant wind directions and velocities (m. p. s.) during September, 1922.

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (396m.)				Due West, S. C. (217m.)				Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		Average.		Mean.		Average.		Mean.		Average.		Mean.		Average.		Mean.		Average.		Mean.		Average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface.....	S. 29° E.	2.1	S. 1° W.	3.6	S. 2° W.	2.7	S. 14° W.	2.0	N. 62° E.	3.2	N. 72° E.	2.1	S. 75° W.	0.9	N. 79° W.	1.0	N. 84° E.	1.6	S. 23° E.	1.7	S. 24° W.	1.2	S. 57° W.	1.5
250.....	S. 26° E.	2.1	S. 1° W.	3.7	.....	.....	.....	.....	N. 58° E.	2.8	N. 68° E.	1.8	.....	.....	.....	.....	S. 85° E.	2.4	S. 20° E.	2.4	S. 28° W.	1.5	S. 57° W.	1.8
500.....	S. 14° E.	2.9	S. 10° W.	5.1	S. 2° W.	3.7	S. 14° W.	2.6	N. 54° E.	3.6	N. 64° E.	2.1	S. 44° W.	0.9	.....	.....	S. 69° E.	3.1	S. 13° E.	4.0	S. 31° W.	3.4	S. 54° W.	3.2
750.....	S. 8° E.	3.2	S. 15° W.	5.8	.....	.....	.....	.....	S. 27° W.	3.8	N. 47° E.	3.6	N. 47° E.	1.9	S. 49° W.	2.4	S. 76° W.	1.5	S. 66° E.	3.4	S. 8° E.	4.5	S. 35° W.	4.1
1,000.....	S. 3° W.	2.8	S. 22° W.	5.6	S. 16° W.	4.8	S. 36° W.	4.1	N. 45° E.	3.8	N. 32° E.	1.9	S. 56° W.	3.5	S. 74° W.	2.5	S. 64° E.	3.9	S. 8° E.	4.7	S. 43° W.	4.6	S. 60° W.	4.9
1,250.....	S. 16° W.	2.5	S. 26° W.	5.6	S. 32° W.	5.0	S. 51° W.	4.4	N. 41° E.	4.4	N. 22° E.	2.4	S. 64° W.	4.1	S. 75° W.	3.1	S. 64° E.	4.0	S. 8° E.	4.8	S. 54° W.	5.2	S. 72° W.	5.9
1,500.....	S. 33° W.	2.4	S. 35° W.	5.5	S. 45° W.	5.2	S. 61° W.	5.0	N. 40° E.	5.1	N. 14° E.	2.9	S. 68° W.	4.7	S. 82° W.	4.0	S. 62° E.	4.8	S. 10° E.	4.7	S. 60° W.	5.9	S. 76° W.	6.6
2,000.....	S. 43° W.	2.5	S. 41° W.	6.4	S. 60° W.	5.1	S. 70° W.	6.0	N. 32° E.	4.5	N. 7° E.	2.8	S. 75° W.	6.2	S. 82° W.	5.5	S. 62° E.	4.2	S. 9° E.	4.5	S. 64° W.	8.3	S. 76° W.	8.7
2,500.....	S. 50° W.	2.4	S. 43° W.	5.5	S. 66° W.	5.6	S. 78° W.	7.6	N. 41° E.	6.1	N. 18° E.	3.0	S. 72° W.	7.0	S. 84° W.	7.4	S. 70° E.	4.9	S. 13° E.	4.4	S. 66° W.	11.8	S. 78° W.	10.3
3,000.....	S. 54° W.	3.1	S. 36° W.	6.3	S. 70° W.	7.7	S. 82° W.	9.3	N. 42° E.	6.7	N. 40° E.	3.9	S. 83° W.	9.7	S. 86° W.	9.5	S. 89° E.	5.1	S. 11° E.	4.3	S. 66° W.	14.7	S. 78° W.	12.7
3,500.....	S. 60° W.	3.4	S. 42° W.	5.4	S. 69° W.	10.1	N. 39° W.	10.5	N. 43° E.	7.0	N. 43° E.	7.0	S. 82° W.	12.6	S. 85° W.	10.9	N. 58° E.	5.9	S. 6° E.	3.9	N. 86° W.	14.0	S. 85° W.	12.7
4,000.....	S. 43° W.	5.1	S. 62° W.	6.7	S. 89° W.	11.3	N. 76° W.	12.5	N. 53° E.	9.0	N. 53° E.	9.0	.....	.....	.....	.....	N. 60° E.	4.6	S. 10° E.	4.6	N. 42° W.	19.9	N. 77° W.	10.9
4,500.....	S. 65° W.	5.8	S. 85° W.	7.4	N. 67° W.	15.9	N. 67° W.	14.8	N. 45° E.	13.1	N. 45° E.	13.1	N. 67° W.	16.7	N. 70° W.	15.8	.....	.....	.....	.....	.....	.....	.....	.....
5,000.....	.....	.....	.....	.....	N. 75° W.	16.7	N. 68° W.	16.3	N. 45° E.	13.8	N. 45° E.	13.8	N. 45° W.	14.4	N. 88° W.	13.7	.....	.....	.....	.....	.....	.....	.....	.....

## THE WEATHER ELEMENTS.

By P. C. DAY, Meteorologist in Charge of Division.

### PRESSURE AND WINDS.

During September the development of the continental high-pressure area over the United States, characteristic of the colder months of the year, signs of which are frequently observed in August, is usually well under way in nearly all parts of the country. The only exception to this is in the extreme southeastern part where the occa-

sional recurving of tropical storms tends to a further lowering of the average pressure as compared with August. In the Canadian Northwest, immediately east of the mountains there appears to be a slight temporary halt in the development of the winter-high area, and pressure there is slightly lower than in August. Indications of this are also noticed in the adjacent portions of the United States. To the westward of the mountains and over the eastern Provinces the average pressure for September increases over that for August, the excess becoming fairly large in the Maritime Provinces.

During September, 1922, cyclonic activity was at a low ebb, and no extensive or important storms occurred within the continental United States, although several storms of tropical origin approached the southeastern coast districts. On the other hand, anticyclones were slightly in excess of the normal, were well defined, covered wide areas, and persisted to an unusual extent over the more eastern districts.

For a month as a whole, the average pressure was above normal in all parts of the United States and Canada, save locally over the Pacific Coast States, and the British Northwest Provinces, where it was slightly less than the September normal.

The average pressures were likewise greater than those for August in all districts, save in California and extreme southern Florida. The increases above the August values were usually large over the districts from the middle Mississippi Valley northeastward to the Canadian Maritime Provinces.

In the absence of important cyclones, high winds were confined mainly to the Atlantic coast sections which came under the influence of the tropical storms moving northeastward near the coast during the latter part of the second and the early part of the third decade, but nowhere were the winds of marked severity.

On account of rather persistent high pressure over the central-eastern districts, the prevailing winds from the Great Plains eastward assumed the courses of those usually attending anticyclones, northeasterly on the middle and south Atlantic coasts, easterly over the Gulf States, southerly in the Plains States, and mostly from the southwest over the Great Lakes. In New England and the adjacent portions of New York, southerly winds prevailed, while in the far West they were likewise mainly from southerly points, save along the immediate Pacific coast, where they were from north to northwest.

Local high winds due to thunderstorm activity, were much less frequent than in the preceding month, and damage from such storms was likewise far less.

A list of the more important storms as obtained from newspaper and other sources appears at the end of this section.

#### TEMPERATURE.

September, 1922, will pass into history as a month marked by unusual persistence of warm and delightfully pleasant days, with few abrupt and important temperature changes.

Important periods of unusual warmth were on the 1st and 2nd, when maximum temperatures frequently above 100° and locally as high as ever observed in September, were reported from Arizona and New Mexico northeastward to the middle Mississippi Valley; from the 4th to 8th over much of the central valleys and southern districts, the 6th being the warmest ever reported in September at numerous points in the upper Mississippi Valley, the warmth extending into the Ohio Valley and eastern districts during the 7th and 8th, where likewise some record-breaking day temperatures were reported; on the 11th and 12th high temperatures were observed over the districts from the Rocky Mountains westward, the 11th being particularly warm in portions of Oregon and adjacent States, where the maximum temperatures were as high as, or locally higher than, ever before observed so late in the month.

Day temperatures of 100° or higher were observed locally in all the States at some time during the month, save those along the northern border from the Great

Lakes eastward and in some of the Middle Atlantic Coast States.

The highest temperature recorded during the month, 118°, occurred in southern Arizona on the 1st, and in southern California on the 16th.

The coldest periods of the month were mainly during the last week, although in the Middle Plains they occurred considerably earlier, and in the far Northwest they occurred during the first week of the month. Freezing temperatures were confined mainly to the mountain regions of the West, and to the more Northern States. In many of the Central and Southern States generally killing frosts had not occurred at the end of the month.

The lowest temperature reported during the month, 11°, was observed on the 29th at a point in the mountains of Idaho.

The mean temperature of the month, as a whole, was above the normal in practically all parts of the United States and Canada, the only exceptions being narrow strips along the east Gulf and South Atlantic coasts, and over the extreme eastern portion of the Canadian Maritime Provinces, where there were monthly means slightly less than normal.

Throughout much of the country from the Rocky Mountains westward it was the warmest September in many years. In California, and other fruit-growing sections near by, the continued heat with almost constant sunshine greatly favored the ripening and drying of the various crops.

#### PRECIPITATION.

The most notable feature of the weather during the month under discussion, was the general lack of rainfall over nearly all parts of the country. Of the 48 States only 4 had average precipitation equal to or above the normal, namely Florida, Ohio, Michigan, and North Dakota.

The early part of the month had rather frequent local showers over considerable areas in the western mountain regions, and over the northern border States as far eastward as the Great Lakes, as well as in portions of the Missouri Valley. About the 9th general showers set in from the middle Great Plains northeastward to the upper Lakes and gradually spread to the eastward during the following two or three days, bringing the most important precipitation of the month to large areas in the central valleys and eastern districts.

Near the middle of the month there was considerable precipitation over the Gulf States, local falls up to more than 5 inches being reported in 24 hours or less on the east Texas coast, where heavy rains continued from the 15th to 20th. About the end of the second decade there was considerable precipitation over the central valleys, and during the first few days of the third decade there was more or less precipitation along the immediate Atlantic coast from Florida to Chesapeake Bay.

The last decade of the month was without material rainfall over the greater part of the country, and as the precipitation during the preceding portions had been insufficient over large areas, much of the country at the end of the month was suffering from severe drought. This was particularly the case in districts from the Mississippi Valley eastward, where locally the periods without material precipitation were the longest of record.

Despite the general dryness over the country as a whole, a few localities had unusually heavy rains. In southern Florida, Fort Myers reported more than 17 inches, and at points near the southern Texas coast more

than 18 inches occurred, Corpus Christi reporting the greatest monthly precipitation in the history of the station. Likewise in Michigan, Port Huron with a total fall of 6.38 inches had the wettest September in 50 years, although practically all this amount fell before the 15th.

In the vicinity of Washington, D. C., one of the heaviest rainfalls of record occurred during the early morning of the 2d. This storm<sup>1</sup> was not associated with the significant features usually attending heavy precipitation, and was extremely local in character. The region of heaviest precipitation appeared to have been central over Prince Georges County, Md., where at Cheltenham nearly 6 inches fell within a comparatively short period. From this point the amounts diminished to slightly over 5 inches at Ferry Landing in Calvert County, a few miles southeast of Cheltenham, and to a similar amount at Washington, D. C., a somewhat greater

distance to the northwest. From these points the amounts diminished rapidly, particularly toward the Virginia side, where only moderate falls were reported to the westward of the counties bordering the Potomac River.

#### RELATIVE HUMIDITY.

Throughout the length and breadth of the country the relative humidity, even more uniformly than the precipitation, was below normal, though the variations from normal were usually not so large as the general drought conditions would indicate. A few small areas in New England, the Lake region, the far Southwest, and the coast districts of Washington, had monthly averages slightly above normal.

Over the Great Plains and western mountain districts the monthly means ranged from 10 to 15 or even 20 per cent less than the average, the larger amounts generally being associated with the evening observation.

<sup>1</sup> For a detailed description of this storm see p. 487 of this REVIEW.

#### SEVERE LOCAL STORMS.

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.]

Place.	Date.	Time.	Width of path. (yards).	Loss of life.	Value of property destroyed.	Character of storms.	Remarks.	Authority.
Needles, Calif.	1		Yards.			Wind	Houses reported blown down and several persons killed. Velocity of wind estimated 90 miles.	New York Herald (N. Y.); official, U. S. Weather Bureau.
Bismarck, N. Dak.	2		4,400			Wind and hail	Damage to buildings, trees, etc. Path of storm 24 miles wide and 60 miles long.	Official, U. S. Weather Bureau.
Yuma (north of) and Mohave and Yavapai Counties, Ariz.	2					Rain	Heavy rains caused three serious breaks in the main canal of the Yuma irrigation project. Bridges and culverts washed out and highways damaged in Mohave and Yavapai Counties.	Do.
Binghamton, N. Y.	6	P. m.				Wind and rain	Heaviest damage to trees and streets. Cellars flooded, and streets blocked by fallen trees and branches.	The Press (Binghamton, N. Y.).
Johnson City, Tenn.	4					Rain	Portions of the town flooded damaging stocks of goods in the basements of several business houses.	Official, U. S. Weather Bureau.
Connecticut coast	6	P. m.				Wind, rain and hail	Traffic delayed, wires and trees blown down. Lives of many on the sound endangered and several persons reported missing.	New York Sun; Tribune (N. Y.).
Fellsburg, Kans.	8	P. m.				Wind and rain	Several buildings demolished.	Wichita Eagle (Kans.).
Corpus Christi, Tex., and adjacent territory.	15-20				\$103,000	do.	Streets, bridges and culverts damaged.	Official, U. S. Weather Bureau.

#### STORMS AND WEATHER WARNINGS.

EDWARD H. BOWIE, Supervising Forecaster.

#### WASHINGTON FORECAST DISTRICT.

Aside from frost warnings on a number of days for the lowlands of New Jersey and for the more northern and elevated districts of the Atlantic States and the Ohio Valley, the important warnings issued during the month were in connection with two storms of the western Atlantic. The first of these originated in low latitudes east of the Lesser Antilles, the French S. S. *Mont Rose* encountering it about 200 miles east of Martinique. This vessel received slight damage. Moving west-northwestward this disturbance passed the vicinity of St. Martin on the 16th on a northwest course and later recurved and passed over Bermuda during the early morning of the 21st. At Hamilton, Bermuda, the lowest barometer reading reported was 28.72 inches, the wind reaching hurricane velocity. Preliminary advices concerning this disturbance were issued on the 14th and they were continued daily until after the disturbance passed to the northward of Porto Rico, after which time the complete absence of reports made the issue of authen-

tic advices impossible. On its approach to Bermuda, warning of increasing winds and rain were sent by radio to vessels in the vicinity of Bermuda.

While the first of these disturbances was in progress another developed off the east Florida coast, the first evidences of it appearing the morning of the 18th, when northeast warnings were displayed along the coast from Cape Henry, Va., southward to Brunswick, Ga. Later during the same day northwest storm-warnings were displayed at and between Jacksonville and Jupiter Inlet, Fla. This disturbance increased in intensity and moved slowly northwestward during the 18th. On the morning of the 19th its center was near latitude 30° N. and longitude 78° W., and moving more to the northward, but slowly. Warnings were repeated on the 19th and vessels off the South Atlantic coast were again advised to exercise caution. From its position on the 19th this disturbance advanced north and then northeastward and passed off Cape Hatteras in an easterly direction on the 22d. On the early afternoon of the 20th storm-warnings were ordered displayed on the coast northward from the Virginia coast to Delaware Breakwater and the morning of the 21st the display was extended northward on the coast to Boston, Mass. No observations have